Applicant is however surprised to find, although the Examiner has withdrawn such restriction requirement recognizing the originally required Divisional Applications , that the Examiner now maintains objections as to double patenting

In order to clarify such condition, Applicant furtheron provides a repeat of said more detailed arguments for the Examiner's due consideration.

Applicant respectfully disagrees and is of the opinion that the Examiner is still in error, citing prior US Patent No: 6,736,118, US Applications 10/798,292 and 10/798,294 as a reason for rejection under 35 U.S.C. 101, double patenting.

Examiner should consider the correct status of this Application, which is a Divisional of Parent Patent 6,736,118, and is related to Divisional Applications 10/798,292 and 10/798,294, and is properly identified as such on page 1 of the subject Application, below the Title, as amended on July 7, 2004.

35 U.S.C. 121 DIVISIONAL APPLICATION provides the following rule.
If two or more independent and distinct inventions are claimed in one application, the Director may require the application to be restricted to one of the inventions. If the other invention is made the subject of a divisional application which complies with the requirements of section 120 of this title, it shall be entitled to the benefit of the filing date of the original application. A patent issuing on an application with respect to which a requirement for restriction under this section has been made, or on an application filed as a result of such requirement, shall not be used as reference either in the Patent and Trademark Office or in the courts against a divisional application or against the original application or any patent issued on

either of them, if the divisional application is filed before the issuance of the patent on the other application.

As the filing date of the subject application precedes the issuance date of Patent 6,736,118, and as this divisional application 10/614,004 was filed in accordance with the instructions by the Director, Applicant is of the opinion that the Examiner is therefore very much in error when citing US Parent Patent 6,735,118 and Divisional Applications 10/798,292 and 10/798,294 as objections.

When referencing the Office file of US Patent 6,736,118, the Examiner will find the Director's request for a division of invention, under which Applicant has filed the subject divisional application and has suitably identified it as to said relationship.

With regard to the filing date of application 10/614,004 which is indicated by the Examiner as 07/08/03, Applicant respectfully draws the Examiner's attention to the 35 U.S.C. 120 rule, which states that a divisional application shall be entitled to the filing date of the parent application, such filing date being November 14, 2002.

Applicant is of the opinion to have herewith responded to thuis ection of the Office Action as required, and the Examiner should therefore make proper and all-inclusive reference to such response.

For more detailed arguments regarding "Double Patenting" please refer to Section 7, Page 31 of this response.

2. Applicant's Premier Objection

Altough Applicant consideres himself to be an ardent Environmentalist, Applicant strongly objects to the Examiner recycling, word for word, the previous Office Action of Examiner J. Cocks, dated 03,04,2005, re: Application 10/798,292. In fact, this Examiner has therefore copied all the flawed and erroneous assumptions and errors, without actually forming any of his own conclusions.

Specifically under 2. Drawings, this Examiner is objecting to Applicant's drawings as not properly relating to Claims 28 and 40, as well as to Claims 31 and 43, when in fact the Claims under examination are Claims 63 to 84, please refer to your own Office Action Summary. Contrary to the action demonstrated by the Examiner, Applicant will respond to the Examiner's intent rather than errors.

3. Information Disclosure Statement

The Examiner states the following objections:

The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP paragraph 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper". Therefore, unless the references have been cited by the Examiner on form PTO-892, they have not been considered.

It appears that this Examiner, in accordance with Office practice, is making use of the identical wording, phrases and expressions contained in a similar argument regarding a further Division Application presently under examination, which reads as follows:

The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP paragraph 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper". Therefore, unless the references have been cited by the Examiner on form PTO-892, they have not been considered.

Applicant will therefore repeat the identical reasoning used to overcome the stated argument as included in the response related to divisional applications 10/798,292 and 10/798,294, and provide arguments to identify Examiner's error.

The Examiner indicates that Applicant has incorrectly incorporated an information disclosure reference in the description of the invention. Applicant disagrees with the Examiner and directs the Examiner to the description of the Parent Application 10/293,357, now issued as Patent 6,736,118, wherein similar disclosures were included and accepted by the Commissioner as proper "Background" information to the disclosure.

It was the intent of Applicant to cite such reference in order to provide available general pertinent details to the "Background" of the disclosure. In accordance with MPEP paragraph 608.1 (c), such detailed reference is therefore included in the "Background" portion of the application in support of the feasibility of the method and device disclosed in the "Summary" of the application.

Applicant is of the opinion to have shown the Examiner to be in error and respectfully requests the Examiner's re-consideration as to the pertinence of the details disclosed.

4. Drawings

The Examiner states the following objection, which are copied, in accordance with Office practice, from an objection to applications 10/798,292 and 10/798,294. In fact, the objection is in cross-reference to said applications and reads as follows:

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the insulating material forming part of the heat exchanger assembly and the heat storage material being formed as part of the heat exchanger assemblies (claims 28 and 40) and the heat transfer zones being operated form a source other than the combustion or exhaust vent area of the combustion mechanism (claims 31 and 43) must be shown or the feature(s) cancelled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheets should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended". If a drawing figure is to be cancelled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may

(Claims 28 and 40 should read 64 and 76, Claims 31 and 43 should read 67 and 79)

be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

It appears that this Examiner has accepted such faulty conclusions, just like the Examiners reviewing the Divisional 292 and 294 Applications, the details of which read as follows:

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the insulating material forming part of the heat exchanger assembly and the heat storage material being formed as part of the heat exchanger assemblies (claims 24 and 35) and the heat transfer zones being operated form a source other than the combustion or exhaust vent area of the combustion mechanism (claims 27 and 38) must be shown or the feature(s) cancelled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheets should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended". If a drawing figure is to be cancelled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be

renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

It is apparent that the Examiner is also unable to recognize that error in the objection as presented.

Applicant therefore provides the identical arguments and reasoning to prove such error, and cites the following pertinent information:

The Examiner objects to the drawings under 37 CFR 1.83 (a), as not showing every feature of the invention specified in the Claims

The Examiner states that the insulating material cited in Claims 28 and 40 (properly being Claims 64 and 76) is not being shown, when indeed such insulating material, or heat storage material, is indicated in the drawings as the hatch drawn feature surrounding the heat exchanger assembly 6, located at exhaust area 10, as well as the hatch drawn feature surrounding heat exchanger 7 which, as very obvious in the drawing, is located at a heat transfer zone being operated by a source other than the combustion or exhaust gas vent area of the combustion mechanism,

all in accordance with Claims 31 and 43 (properly being Claims 67 and 79). Applicant is thereby in full compliance with the regulations.

The Examiner is therefore mistaken when objecting to the drawings, because the drawings already conform with 37 CFR 1.83(a). The drawings in fact precisely show the required features of the inventions as referred to in the objected Claims, and no alteration, amendment or addition to the drawings should be required.

5. Specification

The Examiner cites the following:

The disclosure is objected to because of the following informalities:
On page 1, line 5 from the bottom the term "power" is misspelled.
On page 4, line 2, "affective" should be spelled "effective".
Appropriate correction is required.

In order to simplify the examination process, it is usually normal practice for the Examiner to make minor typing corrections of the kind cited herein. However, for whatever reason, this does not seem to be appropriate in this case and the Examiner seems to be unwilling to make such accomodation.

The form and wording of the request for corrections is again identical word for word to the request in the 292 and 294 examinations, wherein the Examiner also ignores, or does not recognize, the spelling errors appearing on the Title Page of the application. Said identical requests reads as follows:

The disclosure is objected to because of the following informalities: On page 1, line 5 from the bottom the term "power" is misspelled. On page 4, line 2, "affective" should be spelled "effective". Appropriate correction is required.

Applicant therefore again responds with a more or less identical answer:

The Examiner objects to the disclosure because of certain formalities.

Applicant will again make the corrections as indicated and requested by the Examiner, although Applicant is of the opinion that Examiner could have provided a more accommodating remedy. In addition, Applicant will make the necessary correction in the Title of the Invention on the cover page of the application, the misspelling of the word "hydro carbon", which the Examiner failed to recognise, and which should be changed to read "hydrocarbon" instead.

6. Claim Rejections - 35 USC paragraph 112

The Examiner further cites a number of erroneous objections, again identical to the erroneous objections cited in the 292 and 294 Office Actions, which are described by this Examiner as follows:

"The following is a quotation of the first paragraph of 35 U.S.C. 112:

This specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 63 - 84 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor, at the time the application was filed, had possession of the claimed invention.

*a. Specifically, it has been noted that the range recited in both independent Claims 63 and 75 was not described or specifically mentioned in the specification of the instant application, nor the parent application. The claimed range recitation in question recites "**optimal air operating temperature level of between plus 50 and minus 25 degrees** ". The specification of the parent application only recites a **temperature level of between ambient and minus 40 degrees**. While the new range is clearly within that previously disclosed, the lack of any specific disclosure of the new range is a strong presumption that applicant did not have posession of the claimed range at the time of filing. Stated in another way, it appears that applicant did not have posession of the knowledge to exclude thw two outside ranges that have been omitted in the new range. as applicant is required to disclose the best mode, the limited range now recited in the claims should have been disclosed in the parent application. Since such is not the case, there is strong presumption that applicant did not have posession of the knowledge claimed.*

b. The original disclosure further does not provide support for the range of at least on of said heat transfer zones being related to the exhaust gas vent areaof the combustion mechanism (claims 65 and 77), the range of at least on

of said heat transfer zones being related to the combustion area of the combustion mechanism (claim 66 and 78), said heat transfer zones being operated from a source other than the combustion or exhaust gas vent area of the combustion mechanism (claims 67 and 79), the fuel being a suspended coal dust or a coal dust slurry (claim 73), an insulating material being used to balance any temperature fluctuations occurring in the heat transfer zones (claim76), and a means for the combustion mechanism to convert an oxidation mixture of fuel and air into high temperature, high velocity combustion products to operate a related energy transfer system (claim82).

c. In regards to claims 67 and 79, independent claims 63 and 75 from which they depend require that the first heat transfer zone be related to the combustion mechanism. Claim 67 and 79 require the heat transfer zones to operate from a source other than the combustion or exhaust gas area of the combustion mechanism. The original disclosure does not provide support for a heat transfer zone related to the combustion mechanism but not for the combustion or exhaust gas area of the combustion mechanism

Following is the identical citation by the previous Examiner in the review of the 292 and 294 Applications:

Claim Rejections - 35 USC paragraph 112

"The following is a quotation of the first paragraph of 35 U.S.C. 112:

This specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 23 - 43 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. See MPEP paragraph 2163.06.

The original disclosure does not provide support for an optimal air operating temperature level of between plus 50 and minus 25 degrees Fahrenheit (claims 23 and 34), the range of at least one of said heat transfer zones being related to the exhaust gas vent area of the combustion mechanism (claims 25 and 36), the range of at least one of said heat transfer zones being related to the combustion area of the combustion mechanism (claims 26 and 37), said heat transfer zones being operated from a source other than the combustion or exhaust gas vent area of the combustion mechanism (claim 27 and 38), the fuel being a suspended coal dust or coal dust slurry (claim32), an insulating material material being used to balance any temperature fluctuations occurring in the heat transfer zones (claim35), and the means for the combustion mechanism to convert an oxidation mixture of fuel and air into high temperature, high velocity combustion products to operate a related (turbine) *system (claim 41).*

*In regards to claims 27 and 38, independent claims 23 and 33 from which they depend require that the first heat transfer zone be related to the combustion mechanism. Claim 27 and 38 require the heat transfer zones to operate from a source other than the combustion or exhaust gas area of the combustion mechanism. The original disclosure **does not** provide support for a heat transfer zone related to the combustion mechanism **but not** for the combustion or exhaust gas area of the combustion mechanism*

Applicant must point out to the Examiner that specifically such heat source other than the combustion or exhaust gas area is fully described, both in this application as well as in applications 292 and 294. Please refer to page 5 of the disclosure, where is described the alternative as follows:
Where access to any of such heat source locations is difficult (combustion zone or gas vent area), a heating zone may employ heat from a heat source unrelated to the combustion mechanism.

Applicant therefore poses herewith the identical arguments as in the 292 and 294 examination, proving that the Examiner is in error with each one of his objections cited in this portion of his examination.

Re: Claim Rejections - 35 USC paragraph 112

The Examiner is rejecting Claims 63 to 84 as failing to comply with the written description requirement, stating that the specification does not provide the necessary disclosures to support the details in some of the Claims. The Examiner is also of the opinion that Applicant, as explained in MPEP 2163.06, was not in possession of the claimed invention such as to be reasonably able to convey the subject matter disclosed in the specification to one skilled in the art.

It appears that the Examiner is not aware of the fact that the application herein under examination is a Divisional Application of a Patent already issued, the Parent Patent which discloses more or less identical amount of details and description of the invention and group of Claims, and that a reference to MPEP 2163.06 under

such circumstance, and the Examiner stating that Applicant may not be in possession of the invention, is therefore most inappropriate and totally unfounded.

The Examiner is incorrect, and Applicant herebelow provides the necessary supportive arguments on a Claim by Claim basis.

a) Claims 63 and 75, combustion air operating temperature:

The Examiner claims that no support is provided in the disclosure for an optimal air operating temperature level of between plus 50 and minus 25 degrees Fahrenheit.

Applicant however provides a description of the process of cooling the combustion air in a heat exchange relationship with low temperature fluid hydrocarbon fuel. On page 1 of the disclosure, last paragraph, Applicant describes the known in the art process as one alternative means for cooling intake air, by using the low temperature of LNG Liquid Natural Gas, should the mechanism be operated with that type of fluid fuel, which, as anyone skilled in the relevant art would know, may be at a temperature as low as minus 260 degrees Fahrenheit. Such low fuel temperature easily facilitates a temperature exchange from such fuel to intake air from an ambient temperature (90 degrees F in summer time) to a level of between 50 degrees and minus 25 degrees Fahrenheit, when used in a temperature transfer relationship with the air. Such range is just a narration of the full range available.

On page 2, first paragraph of the disclosure, Applicant further describes the employment of special evaporative air coolers to effectively cool combustion air to increase the operating efficiency of a combustion mechanism as contemplated in his method Claims and device Claims.

In addition, Applicant is illustrating in Fig. 1 of the drawings, how and where the cool fuel 1 passes through the zone at heat exchanger assembly 7, before being routed through fuel heating exchange assembly 6, in order to first cool combustion air 9 prior to its delivery to the combustion zone 3. The Examiner should refer to page 8 of the description, under "Detailed Description of a Preferred Embodiment", where under Figure 1, the various relative steps of the invention are fully explained and detailed. Furthermore, on page 2 last paragraph, Applicant specifies the need to provide the lowest possible combustion air temperature in order to obtain the most advantageous operating condition.

Therefore, when referencing Claims 63 and 84 as being unsubstantiated, the Examiner has copied a mistake without challenge or confirmation.

Applicant, in accordance with 35 USC paragraph 112, has sufficiently concluded with Claims 63 and 84 and is particularly pointing out and distinctly claiming the subject matter which Applicant regards as said particular part of the invention, in a manner reasonably conveying its relevance to one skilled in the art.

However, persons not skilled in the art may have problems recognising the relevancy.

Applicant suggests for the Examiner to visit US Patent 6,736,118, which is the parent Patent to which this Divisional Application relates, and review the precedent. In fact, in such Parent Patent the claimed air cooling temperature range is also larger, between ambient and minus 40 degrees Fahrenheit.

b) Claims 65 and 77, a heat transfer zone related to the exhaust gas vent area of the combustion mechanism:

The Examiner claims that no support is provided in the disclosure for the operation of at least one of said heat transfer zones related to the exhaust gas vent area of the combustion mechanism.

The Examiner is again in error when citing Claims 65 and 77 as not being supported in the description of the invention.

Applicant obviously provides a description of the location of the heating zone at the exhaust area of the combustion mechanism. Starting on page 4 of the disclosure, last paragraph, Applicant begins to describe the zone of heat source related to the combustion mechanism's exhaust area, which, as anyone skilled in the Relevant Art would know, may exhaust flue gas products, or oxidation products, at a temperature as high as 1000 degrees Fahrenheit. Such high flue gas temperature easily facilitates a temperature exchange to a fuel such as fluid hydrocarbons from an ambient temperature (90 degrees F in summer time) to a level of between 50 degrees and 900 degrees Fahrenheit, when used in a temperature transfer relationship.

In addition, Applicant is illustrating in Fig. 1 of the drawings, how and where the heat transfer zone in question is located at the combustion mechanism's combustion product exhaust area 10, which, as is well known to someone familiar with the art, is always related to the energy transfer zone 5 of a combustion mechanism. The Examiner should again refer to page 8 of the description, under "Detailed Description of a Preferred Embodiment", where under Figure 1, the

various relative steps of the invention and the locations of the heating zones relative to the exhaust area of the combustion mechanism are fully explained and detailed.

Therefore, when referencing Claims 65 and 77 as being unsubstantiated, the Examiner is again mistaken.

c) Claims 66 and 78, a range of at least one heat transfer zone related to the combustion area of the combustion mechanism:

The Examiner claims that no support is provided in the disclosure for the operation of at least one of said heat transfer zones related to the combustion area of the combustion mechanism.

The Examiner is in error when citing Claims 66 and 78 as not being supported in the description of the invention.

Applicant does provide a description of the location of the heating zone at the combustion area of the combustion mechanism. On page 5 of the disclosure, first paragraph, Applicant describes the zone of heat source related to the combustion mechanism's combustion area or a heating zone located in the interior of the mechanism, identified in Figure 2 as location 3, which, as anyone skilled in the relevant art would know, may produce combustion products at a temperature as high as or higher than 1300 degrees Fahrenheit. Such high combustion product temperature easily facilitates a temperature exchange to a fluid, such as a fluid hydrocarbon fuel, from an ambient fuel temperature (90 degrees F in summer time) to a level of between 50 degrees and 900 degrees Fahrenheit, when used in an efficient heat transfer relationship.

Applicant is illustrating in Fig. 2 of the drawings, that the heat transfer zone in question is located near the combustion mechanism's interior combustion area 3 and is identified as area 6, which, as is well known to someone familiar with the art, is the first energy transfer zone of a combustion mechanism, experiencing further high temperatures. The Examiner should again refer to page 8 of the description, under "Detailed Description of a Preferred Embodiment", where under Figure 2, the various relative steps of the invention and the location of the heating zone relative to the combustion area of the combustion mechanism a is fully explained and detailed.

The Examiner should also realise that both the high temperature combustion products or combustion exhaust vent products of a combustion mechanism may also be employed as efficient means to operate an air cooling or refrigeration systems by way of thermochemical compression rather than mechanical compression.

The Examiner may want to get familiar with the subject matter he is examining and refer to:

A Brief Primer on Natural Gas Air Conditioning Technologies

There are three basic types of natural gas air conditioning systems:

1. absorption cycle,
2. engine-driven,
3. desiccant systems.

In Southern California, the **absorption cycle** is the most popular natural gas air conditioning system and is similar to electrical systems in that it utilizes a cycle of evaporation and condensation of a fluid or refrigerant to produce cooling.

However, such absorption cycle cooling differs from the vapour compression cycle by **using heat as a "thermochemical compressor" rather than a mechanically-driven compressor.** The source of energy for compression can be from the heat (or waste-heat) from a combustion turbine system fired with gas, oil or coal products, or from a steam or hot water operated dual cycle systems.

Therefore, when referencing Claims 66 and 78 as being unsubstantiated, the Examiner is again in error and copying the same mistake posed by the Examiners of applications 292 and 294.

Applicant however agrees that a person not skilled in the art may have problems recognising the relevancy of that segment of the disclosure. Hence the difference between a person who recognises an unusual circumstance (the Inventor of an invention), and a person trying to understand the principle thereof (the Examiner).

d) Claims 67 and 79, a heat transfer zone related to a zone other than the exhaust gas vent area of the combustion mechanism:

The Examiner claims that no support is provided in the disclosure for the operation of an alternative heat transfer zone other than the combustion or exhaust gas vent areas of the combustion mechanism.

The Examiner is again continuing to make the same obvious error as previously when citing Claims 67 and 79 as not being supported in the description of the invention.

Applicant unmistakably provides an ample description of one obvious location of such an alternative heat transfer zone at said combustion mechanism when describing and illustrating the heat transfer zone located at the air intake location. Furthermore, on page 5 of the disclosure, first paragraph, Applicant purposely indicates that, when access of a heating zone related to the combustion mechanism is not readily available, a heating zone may be employed using heat or energy transfer means from any other operating source known in the art, which may be unrelated to the combustion mechanism.

Therefore, as an alternative, any heat source known in the art may provide the necessary means to operate a heating zone. It is not intended to describe all heating zone means available in the art, but what is being claimed is an example of the most economical means of operating a heating means in an operating zone available under the circumstance. The MOST efficient means of course being a heating zone operated with waste heat from the combustor which it operates. This is not meant to exclude any of the other known in the art alternatives, as stated on page 7 of the disclosure, first paragraph.

In fact, below is the exact and precise description, which states that:
"It must be noted that only a few embodiments of the invention have been illustrated and described and that this disclosure is not intended to be limited thereby but only by the scope and intent of the appended Claims."

In addition, Applicant is illustrating in Fig. 1, 2, 3 and 4 of the drawings, a heat transfer zone 7 not located near the combustion mechanism's exhaust vent area 10, or interior combustion area 3, or the combustion mechanism's energy transfer

area 5, which are all areas well known to someone familiar with the art. The Examiner should again refer to page 8 of the description, under "Detailed Description of a Preferred Embodiment", where under Figure 1, 2, 3 and 4, the various relative steps of the invention and the location of a heating zone other than relative to the combustion area or exhaust vent area of the combustion mechanism are fully explained and detailed.

Therefore, when referencing Claims 67 and 79 as being unsubstantiated, the Examiner is, same as the Examiner of 292 and 294, again mistaken.

e) Claim 73, a fuel being a suspended coal dust or coal dust slurry:

The Examiner claims that no support is provided in the disclosure for the application of the claimed method and device to operate with fuel consisting of a suspended coal dust or a coal dust slurry.

The Examiner continues to accumulate further errors when citing Claim 73 as not being supported in the description of the invention.

Applicant is very clear in his description of the fuel accommodated in the invention, it being a fluid hydrocarbon fuel. In order for the Examiner to substantiate the objection as posed, the Examiner would have to demonstrate and prove to someone skilled in the art that a fuel consisting of a mixture of coal dust and air, or coal dust and a vaporised gas, is not a fluid hydrocarbon fuel. The Examiner would need to further demonstrate and prove to someone skilled in the art that a fuel consisting of a mixture of coal dust and fuel oil to form a slurry is not a fluid hydrocarbon fuel.

Both a suspended coal dust mixture and a coal dust slurry mixture as contemplated by Applicant are considered a fluid hydrocarbon by any person skilled in the art, and such fuel mixture may be found in any listing of fluid hydrocarbon fuels. Applicant has included such variation in Claim 73 so as to further limit the general fluid hydrocarbon fuel description in both independent Claim 63 and Claim 75, all in accordance with the by the Office prescribed requirement for Claim structure.

Applicant suggests that the Examiner reviews MPEP 608.01 (m), FORM OF CLAIMS, which clearly states that Claims should be arranged in order of scope, so that the first Claim presented is the broadest (fluid hydrocarbon fuel), and wherein any dependent Claim thereon should further limit such earlier Claim (coal dust slurry).

The Examiner should also review the reference listed under section ***8.*** of this response, providing detailed and pertinent definitions and accepted meanings of "FLUIDS" in accordance with the art.

Applicant further suggests for the Examiner to refer to USC 35 paragraph 112, SPECIFICATIONS, which states that a Claim in dependent form (Claim 73) shall contain a reference to a Claim previously set forth (Claim 63 or Claim 75, -fluid hydrocarbon fuel-), and then specify a further limitation (suspended coal dust or coal dust slurry) of the subject matter claimed in the dependent Claim (73).

Applicant is in full compliance with such prescribed practice, and when the Examiner is referencing Claim 73 as being unsubstantiated, the Examiner has again continued to make or copy a further very obvious mistake.

f) Claim 40, an insulating material being used:

The Examiner claims that no support is provided in the disclosure for the application of an insulating material to balance temperature fluctuations occurring in any of the heat exchange assemblies.

The Examiner is further in error when citing Claim 76 as not being supported in the description of the invention.

Applicant in the description of his invention makes reference on page 5 that the heat exchanger assembly may in certain applications incorporate a heat equaliser segment from heat storage material (insulating material) as part of the heat exchanger assembly, in order to equalise heat transfer from the heating zone to the heat exchanger during on/off cycles of the combustion equipment. This reference certainly indicates that a heat storage material, which, to be effective, must certainly incorporate, or even consist of, a heat insulating material, is contemplated. In order to substantiate the objection posed by the Examiner, the Examiner would have to demonstrate and prove to someone skilled in the art, that a heat storage material can be effective as such without incorporating insulating provisions to reduce loss of any stored heat.

In addition, Applicant respectfully suggests that the Examiner reviews MPEP 608.01, ORIGINAL CLAIMS, in which is stated that in establishing a disclosure, *Applicant may rely not only on the description and on the drawings as filed, but also on the original Claims, **if their content justifies it***. The content certainly provides all the necessary justifications.

The Examiner has failed to demonstrate that the content of Claim 76 lacks the required descriptive nature, and has thereby not shown that the Claim Content is not justified.

It is obvious that Applicant is in full compliance with the prescribed practice, and when the Examiner is referencing Claim 76 as being unsubstantiated, Applicant is correct in his opinion that the Examiner is again in error.

g) Claim 82, converting the oxidation mixture:

The Examiner claims that no support is provided in the disclosure for the process of converting the oxidation mixture of fuel and air into a high temperature, high velocity combustion product.

The Examiner is committing a further error when citing Claim 82 as not being supported in the description of the invention.

As is apparent to one skilled in the art, that any combustion mechanism requires approximately 445 lb (24 cft) per hour of fuel to produce one MWH MegaWattHour of energy, regardless of the type of energy conversion or combustion process.

If a combustion mechanism were to produce 150 MWH of energy, the average fuel consumption would be 3,600 cft of fuel per hour. Because the ratio of combustion air to fuel gas is at an average between 10:1 and 25 :1, the total amount of oxidant mix volume (combination of air and fuel gas) flowing into and through the combustion area, both before and after ignition, would be at least 39,600 cft per hour. It is obvious that such large amount of fuel would move at a very rapid pace into and through the combustion area of a combustion mechanism. The speed of the oxidant mix flow will be significantly increased as a result of its ignition and combustion in the combustion mechanism, and the typical energy transfer and flow speed of the resulting combustion products may then be subjected to a number of energy exchange methods. The process in this case converts the energy produced during the combustion of the oxidation mix into a pressurized high velocity rotational force for the operation of combustion mechanism systems configured for such energy exchange, both stationary or mobile.

Therefore, when Applicant, in dependent Claim 82, claims the conversion of the oxidation mixture into high temperature, high velocity combustion product, Applicant only refers more specifically to the combustion process of a combustion mechanism used to convert the energy produced into thrust or torque, as described in independent Claims 63 and 75, thereby limiting it to a more precise force required to operate related combustion mechanism systems.

Applicant properly formulates Claim 82 in accordance with the prescribed practice, wherein said dependent Claim 82 provides a further limitation to independent Claims 63 or 75.

Applicant suggests that the Examiner again reviews MPEP 608.01 (m), FORM OF CLAIMS, which clearly states that Claims should be arranged in order of scope, so that the first Claim (Claim 63 or 75, or independent Claim), presented is the broadest (energy conversion to heat, thrust or torque), and wherein any dependent Claim (Claim 82) thereon should further limit (thrust or torque) such earlier Claim.

Furthermore, as it is specifically applicable to this objection, Applicant suggests that the Examiner again reviews MPEP 608.01, ORIGINAL CLAIMS, in which is stated that in establishing a disclosure, Applicant may rely not only on the description and on the drawings as filed, but also on the original Claims, if their content justifies it.

As one familiar in the art readily understands, the reference to forming an oxidation mixture merely describes more precisely the combustion process in a high MW fuel intense combustion system.

The Examiner has failed to demonstrate that the content of Claim 82 lacks the required descriptive nature and instead the Claim content is therefore fully justified. The Examiner has again erred.

h) Claims 67 and 79, second reference to a heat transfer zone related to a zone other than the exhaust gas vent area of the combustion mechanism:

The Examiner claims that no support is provided in the disclosure for the operation of an alternative heat transfer zone other than the combustion or exhaust gas vent areas of the combustion mechanism.

In this case the Examiner is unclear when citing Claims 67 and 79 again in double succession as not being supported in the description of the invention.

The Examiner again unfortunately has copied a typing error directly from previous Office Actions of other Examiners.

This Examiner makes use of the double negative when citing the objection, and Applicant is unable to respond to the Examiner's contradictory and unclear statement.

However, Applicant has already previously provided ample description of one obvious location of both an alternative heat transfer zone to said combustion mechanism, when describing the heat transfer zone located at the air intake location, as well as the location of a heat transfer zone actually related to the combustion mechanism. Applicant suggests for the Examiner to again refer to the description with more care, where on page 5 of the disclosure, first paragraph, Applicant purposely indicates that when access of a heating zone related to the combustion mechanism is not readily available, a heating zone may be employed using heat or energy transfer means from any other operating source known in the art, unrelated to the combustion mechanism, thereby making reference to both a heating zone at the combustion mechanism and the alternative thereto.

j) Claims 63 to 84, are rejected under 35 U.S.C. 112:

The Examiner cites the second paragraph of such Patent Law which reads:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

The Examiner therefore is rejecting Claims 63 to 84 as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as his invention.

If the Examiner is unable to understand the relative Claims and related description of the invention under examination, Applicant respectfully suggests to confer with Primary Examiner Marguerite McMahon, of art unit 3747, and with Department Supervisor Mr. J. Lazarus, which have processed the original Parent Patent 6,736,118 of the application being examined herein, and have caused issuance of said Parent Patent on May 18, 2004 without posing any of the objections being cited herein by this Examiner.

It is Applicant's opinion that there exists a serious conflict of examination procedure, and if the Examiner is sure the referred to Parent Application was issued in error, the Examiner should make Ms. McMahon aware of all the defects contained in said Parent Patent, defects which are now the cause of all the objections now cited by this Examiner.

Applicant however would be more inclined to believe that the Parent Patent 6,736,118, which is now erroneously cited by this Examiner as an objection, was issued competently, which would lead to the reasonable assumption that the

present application is based on valid instructions, all issued under such Parent Patent, and the objections raised by the Examiner may be well unfounded.

In fact, when reviewing independent Claim 63 on its own merits, which reads, or may read after amendments:

*27. **A method** for reducing fuel density while increasing combustion air density, without effecting specified fuel or air volumes, thereby significantly changing the ratio of fuel mass versus combustion air mass, hence oxygen mass, during the process of ignition and combustion of fluid hydrocarbon fuels in combustion mechanisms having a combustion area and at least one burner therein for converting said fuel into heat, thrust, torque or other energy, comprising:*

a) providing a constant volume of fluid hydrocarbon fuel as fuel for said combustion mechanism;

b) directing said constant volume of fuel through a primary fuel supply conduit defining a heat exchanger assembly that extends through a heating zone related to the combustion or exhaust vent area of the combustion mechanism, having a fuel inlet and a fuel outlet;

c) reducing the density of said fuel by reducing fuel mass in said constant volume of fuel through heating the fuel to an optimal operating temperature level ranging between 100 degrees Fahrenheit and the fuel's flash point or auto-ignition temperature level as it flows through said heat exchange assembly;

d) maintaining a constant volume of density reduced fuel for ignition in the combustion area of said combustion mechanism;

e) providing a constant volume of combustion air for the combustion process in said combustion mechanism;

f) directing said constant volume of combustion air through a primary air supply conduit defining a heat exchanger assembly that extends through a cooling zone having an air inlet and an air outlet;

g) increasing air density of said constant volume of combustion air through cooling said combustion air to an optimal operating temperature of between ambient temperature or plus 50 degrees and minus 40 degrees Fahrenheit as it flows through said air heat exchanger assembly;

h) maintaining a constant volume of cooled high density air for combustion in the combustion area of said combustion mechanism;

Claim 63 is pertinent and as such fully describes, particularly points out and distinctly claims the subject matter which the Applicant regards as his invention, and which is already competently approved and recognised as such by the US Patent Office, and documented through the issuance of the Parent Patent 6,736,118

If the Examiner is in conflict with such parameters, the Examiner should suggest to the Commissioner to review this particular case, as the Commissioner's seal and signature are affixed to said approved and issued Parent Patent. Otherwise, Applicant respectfully suggests for the Examiner to admit that he has made a further error.

7. Double Patenting:

The Examiner cites the following rejection:

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by

a patent and to prevent possible harrassment by multiple assignees. See In re Goodman, 11 F.3d 1046, 29 USPTOQ2d 2010 (Fed. Cir.1993); In re Longi, 759 F.2d 887, 225 USPTOQ 645 (Fed. Cir. 1985); In re Van Ornum 686 F.2d 937, 214 USPTOQ 761 (CCPA 1982); In re Vogel, 422 F.2d 438, 164 USPTOQ 619 (CCPA 1970); and In re Thorington, 418 F.2d 528, 163 USPTOQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registerede attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b)

When reviewing the above cited references, none are related to Divisions.

Claims 63 to 84 provisionally rejected under the judicially created doctrine of double patenting over claims 27 to 48 of copending Application No: 10/798,292. This is a provisional double patenting rejection since the conflicting claims have not yet been patented.

The subject matter claimed in the instant application is fully disclosed in the referenced copending application since the referenced copending application and the instant application are claiming common subject matter, in which the claims are identical.

Claims 63 to 84 are rejected under the judicially created doctrine of obviousnesstype double patenting as being unpatentable over claims 23 to 43 copending application 10/798,294. Although the conflicting claims are not

identical, they are not patentably distinct from each other because the difference would have been obvious to one of ordinary skill in the art. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have incorporated the claimed ranges and values into the invention disclosed, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPTOQ 233.

The Examiner again uses similar wording and non-applicable references as used in the examination of 10/798,294 by the other Examiner. This Examiner thereby repeats the errors contained in such previous argument cited:

The Examiner is again contradicting an office decision arrived at when the Parent Application 6,736,118 was processed. At that time the Director of the US Patent Office came to the conclusion that the Divisional Application herein examined is NOT "the same invention", and requested the division of all other such further Inventions derived from said disclosure which subsequently become such Parent Patent. Furthermore, Applicant suggests for the Examiner to reference Office Action, Confirmation No: 6276, dated 06/22/2004, wherein Examiner Clarke in first examining this divisional Application requests further restrictions.

In fact, Ms. Clarke made the decision that Application 10/614,004, which is of course a divisional of Parent Patent 6,736,118, contains the following further patentably distinct inventions: a) a space heater, b) a water heater, c) a process heater, d) a hydronic boiler, e) a furnace, and f) a turbine.

Applicant is of the opinion that prohibition of double patenting does apply, and suggests that the Examiner has grossly misinterpreted MPEP 894.01, example F, which in fact specifies that the *"issue of double patenting may arise as to whether 35 USC 121 prevents the use of a double patenting rejection when the identical invention is claimed*.....however.....*35 USC 121 of course does not provide any rule for rejecting NON identical inventions.*

As the Office has already made the decision that the various inventions contained in the Parent Application are **NON identical inventions**, the Examiner's decision contradicts such already established decision. Unless the Examiner is able to prove that the Office decision by the Director is faulty, even a provisional rejection, especially if based on judicially created doctrine, is incorrect and improper.

Applicant herewith cites the US Patent Office decision as formulated in the first office action of Examiner McMahon, dated July 17, 2003.

DETAILED ACTION

Election / Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121;

Invention I	*Various types of heaters*	*class 431*
Invention II	*A single or dual cycle power generator*	*class 310*
Invention III	*A gas turbine engine*	*class 60*
Invention IV	*An internal combustion engine*	*class 123*

The inventions are distinct, each from each other because of the following reasons: Inventions I, II, III and IV are unrelated as it can be shown that they perform different functions, all in accordance with the quoted reference MPEP paragraph 806.04 and paragraph 808.01.

When filing the original Parent Application, it was Applicant's intention to show that the invention was only one invention, and that no restriction was required, but it was the decision of the Patent Office that said application contained at least four separate Inventions, which were distinctly identified.

If the Examiner in this action continues to be of a different opinion, Applicant respectfully suggests for the Examiner to take the necessary steps within the US Patent Office to demonstrate that the Commissioner has acted in error when requesting division and when issuing the Parent Patent, and that the Examiner has all the necessary information and competent details to prove such error.

For Examiner's guidance, Applicant would further like to draw attention to the following rules and regulations with regards to a rejection under Double Patenting.

35 U.S.C. 121 DIVISIONAL APPLICATION provides the following rule.
If two or more independent and distinct inventions are claimed in one application, the Director may require the application to be restricted to one of the inventions. If the other invention is made the subject of a divisional application which complies with the requirements of section 120 of this title, it shall be entitled to the benefit of the filing date of the original application. A patent issuing on an application with

respect to which a requirement for restriction under this section has been made, or on an application filed as a result of such requirement, shall not be used as reference either in the Patent and Trademark Office or in the courts against a divisional application or against the original application or any patent issued on either of them, if the divisional application is filed before the issuance of the patent on the other application.

In determining whether a proper basis exists to enter any type of double patenting rejection, the Examiner must determine the following:

(A) Whether a double patenting rejection is prohibited by the third sentence of 35 U.S.C. 121 (see MPEP Section 804.01; if such a prohibition applies, a double patenting rejection cannot be made);
(B) Whether a statutory basis exists; and
(C) Whether a nonstatutory basis exists.

Each determination must be made on the basis of all the facts in the case before the Examiner.

804.01 Prohibition of Double Patenting Rejections Under 35 U.S.C. 121

When processing the first filed Parent Application, the Director has already made the decision that such Application contained four independent and distinct inventions. Applicant therefore respectfully suggests for the Examiner to challenge the Director, should the Examiner insist that the Director was at fault when making such decision, proving that the referred to inventions are in fact one and the same.

When filing the first Parent Application, it was Applicant's intention to file a single Application for a single invention, applicable to the various classes. However, it was the Director's decision that said Parent Application contained a number of independent and distinct inventions, in fact the Director precisely specified such distinctions.

With regards to any possible conflict between the present application and applications 10/798,292 and 10/798,294, it is Applicant's intention, depending on the decision by the Examiner which of the present Claims may finally be accepted, to agree to a restriction of application 004 for industrial process heaters and furnaces or smelters for commercial and heavy industrial operation, as may be classified in class 431 (Invention I, as per original Restriction for Division).

Where required, Applicant will nevertheless endeavor to amend Claims in such a fashion as to overcome any possible objections that may be plausible, as already indicated. If necessary, Applicant will attach Amendments, including amended Claims pages for replacement of the original.

With regard to the filing date of application 10/614,004, Applicant again respectfully draws attention to the 35 U.S.C. 120 rule, which states that a divisional application shall be entitled to the filing date of the parent application, such filing date being November 14, 2002.

It is therefore obvious that when the double patenting objection was posed by the Examiner and the references cited to substantiate such objection, the Examiner

did NOT make his determination based on all the facts in this case (Emphasis added).

Should the Examiner however be able to convince the Director and re-combine the various inventions identified by the Director as separate, distinct and independent, Applicant would be very pleased and grateful to the Examiner, and would then apply for a refund of the costs incurred due to the number of divisions and separate filings incorrectly requested by the Director.

8. Claims Rejection under 35 USC paragraph 102:

The Examiner cites that Claims 63, 65, 68, 69, 72, 74, 75, 77, 80, 82 and 84 are rejected under 35 U.S.C. 102(b) as being anticipated by Arenson in 3,720,057, claiming that the invention shows all of the claimed limitations.

The Examiner supports his incorrect and inconclusive assumptions when citing further in accordance with the quotation of the appropriate paragraphs of 35 USC 102 that form the basis for a rejection under this section made in this Office action:

*A **person shall be entitled** to a patent unless -*

b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Applicant will provide the required proof that the Examiner is incorrectly referencing the Arens Patent 3,720,057 as representing such previously patented invention or printed publication, improperly citing the following.

Claims 63, 65, 68, 69, 72, 74, 75, 77, 88 to 82, and 84 are rejected under 35 USC 102(b) as being anticipated by Arenson (3,720,057), which shows all of the claimed limitations. Arenson shows a process and device where a first exchanger assembly (116) extends through a first heat transfer zone related to the combustion mechanism and a second heat exchanger assembly (126) extending through a second heat transfer zone of the combustion mechanism. The fuel supplied through conduit (120) is heated at exchanger (116), which is heated by exhaust gases from a combustion mechanism conveyed through line (114). Air is conveyed through conduit (128) to the second heat exchanger (126). Example 2 (beginning in column 12) shows that natural gas leave heat exchanger (116) at a temperature of 168 degrees F and that air leaves heat exchanger (126) at a temperature of 40 degrees F. These specific examples fall within applicant's claimed temperature ranges.

In regard to claim 69 and 82, in order for the combustion device (gas turbine engine 112) of Arenson to operate, there is necessarily some means for converting the oxidation mixture of fuel and air into high temperature, high velocity combustion products. Further, as shown in Figure 1, the exhaust products are used to heat a first heat exchanger (32) and an additional heat exchanger (46), which is considered to be a related energy transfer system.

When citing the Arenson invention as an objection to this Application, the Examiner is incorrectly comparing Applicant's invention, which, as defined by the Director of the Office is a distinct and independent invention under classification 431 (according to distinct invention I, various types of heaters class 431), with an invention under classification 60 (according to distinct invention III, a gas turbine engine class 60).

. Therefore citing such objection as relating to this application should be considered inappropriate. Such citation, although still inappropriate, may be more applicable to invention III.

However, should Examiner still be convinced otherwise, Applicant will provide the following further reasons to prove the Examiner to be mistaken.

When comparing this application with the Arenson invention, it is obvious that the Examiner has ignored one of the major distinction of Applicant's invention, disclosed and distincly described in both independent Claims. Applicant makes specific reference to the hydrocarbon fuel being a fluid. I suggest for the Examiner to investigate the specific meaning and allocation of the word fluid, especially when the word is to describe a matter other than a liquid, like air, or a gas already in its vaporous state.

This is in fact the reason why Applicant has always referred to the fluid hydrocarbon fuel described in his independent Claims as a fluid fuel "such as" natural gas, and "or the like" in order to provide the distinction of such fuel being in a state other than a liquid, such as a vapour or a gas, all as in previously issued patents.

When the Examiner consideres Applicant's use of the phrase "such as" and "the like", on the basis that it renders the Claims more definite, the Examiner will be able to realize the distinction more readily. In fact the use of said phrases in this case render the Claims more specific and more clear especially for comparison with the Arenson Claims.

The difference and uniqueness of Applicant's invention over Arensen is related directly to such contained and significantly distinct subject matter detailed in the description and Claims, the fundamental difference between "Fluid" and "Liquid".

For the Examiner's understanding, the following is the Webster's Dictionary definition of "FLUID":

Definition: Fluid

Adjective

1. Subject to change; variable; "a fluid situation fraught with uncertainty"; "everything was unstable following the coup.

2. Characteristic of a fluid; capable of flowing and easily changing shape.

3. Smooth and unconstrained in movement; "a long, smooth stride"; "the fluid motion of a cat"; "the liquid grace of a ballerina"; "liquid prose".

4. In cash or easily convertible to cash; "liquid (or fluid) assets".

5. Affording change (especially in social status); "Britain is not a truly fluid society"; "upwardly mobile".

Noun

1. A substance that is fluid at room temperature and pressure.

2. A continuous amorphous substance that tends to flow and to conform to the outline of its container: **a liquid or a gas**.

Specialty Definition: Fluid

Aerospace

A substance which, when in static equilibrium, cannot sustain a shear stress; **a liquid or a gas**. This concept is only approximated by actual liquids and gases.

Mining

A. The quality, state, or degree of being **fluid**: **a liquid or gaseous state**. CF:gas

B. The physical property of a substance that enables it to flow and that is a measure of the rate at which it is deformed by a shearing stress, as contrasted with viscosity: the reciprocal of viscosity.

C. In mineral transport, the term is **not confined to liquids and slurries, but is also used for finely divided solids that flow readily in aircurrents**, fluosolids reactors, or through dry ball mills.

Fluid Mechanics

A branch of science that deals with the special properties of **liquids, vapors and gases**.

Based on the before listed definition of a "Fluid Hydrocarbon Fuel", the Examiner should be able to recognise that the Arenson disclosure is not at all related to the present invention. In fact, when reviewing the Arenson Claim 1, the difference is most obvious.

Arenson defines his invention as

"A method of continuously vaporising and superheating a stream of liquefied cryogenic fluid for an ultimate use, comprising the steps of a) passing said cryogenic fluid in heat exchange relationship with ambient water to heat and vaporise said cryogenic fluid stream".

As the Examiner has surely noticed, said segment of method claimed by Arenson is strictly for the purpose of converting stored LNG Liquid Natural Gas, or LPG Liquid Propane Gas or other liquid cryogenic fluids, into their vaporous state. The described liquid cryogenic fluid is understood to be at a temperature of minus 260 degrees Fahrenheit. See column 10, Example 1 of US 3,720,057.

Applicant defines a specific Combination Method in his invention in independent Claim 63 as *"A method for reducing fuel density while increasing combustion air density for the purpose of significantly changing the ratio of oxygen mass".*

The method combination claimed by Applicant for the equivalent fuel preheating segment of the combination is NOT for the purpose of vaporising the fuel, but is instead specifically for improving the ratio of oxygen mass versus fuel mass. Applicant further describes the lowest ambient operating level of a gaseous fuel, or liquid fuel for that matter, from which temperature will be raised, as 35 degrees Fahrenheit, which provides an already vaporous condition, certainly not minus 260 degrees F, which is Arenson's ambient fuel temperature.
See page 3, 1st and 2nd paragraphs of the application 10/614,004.

There is absolutely NO comparison to be drawn between the method disclosed by Arenson and the combination method described in Applicant's disclosure. Even in view of the Velke US 5,888,060 Patent, persons familiar in the art would be unable to reach the conclusion as speculated by the Examiner. In fact, Applicant herebelow provides the necessary support for his conclusion by citing a response received by the CGRI Canadian Gas Research Institute, a Canadian gas combustion expert, which had been requested, under a suitable confidentiality arrangement, to provide an opinion as to the preheating of fuel resulting in an improvement or increase in the oxygen ratio in a combustion process.

Following was the CGRI response:

In a letter addressed to the Applicant, dated April 27, 1999, CGRI Research Engineer Martin Thomas provided an opinion on behalf of the Canadian Gas Research Institute, that:

"Oxygen enrichment of the combustion air (i.e. increasing the oxygen concentration in a volume of combustion air) is a well established industrial process improvement technique. In our opinion, the "Velke Invention of" *preheating a fuel gas does not provide oxygen enrichment. To our knowledge, oxygen enrichment can only be achieved by adding oxygen to air, or by removing the other constituents (nitrogen, CO2, argon, etc.) from the air. Therefore, we cannot support the claims made for the* "Velke Disclosure" *as a result of improvements caused by oxygen enrichment."*

CGRI the Canadian Gas Research Institute, a well recognised authority in the gas industry, thereby confirms industry opinion that the any enrichment or increase in the oxygen ratio of a given volume of combustion air can only be achieved by adding actual oxygen, or by removing the other constituents, but cannot be achieved by any other means, such as preheating of fuel or precooling of combustion air.

CGRI concludes its letter of opinion by stating that "*Because CGRI is unable to explain, through sound scientific principles, the claimed / measured benefits,....CGRI will no longer be involved in the evaluation process.*"

Applicant's invention is therewith definitely confirmed as being unique. Such method is not disclosed, nor contemplated or even hinted in the Arenson invention.

Any further relations cited by the Examiner between Arenson and Velke, including some of the operating stages of the Patent 5,888,060 disclosure, do NOT provide the required obviousness to anyone skilled in the art, as claimed by the Examiner.

9. Claim Rejection - 35 USC paragraph 103

The Examiner cites the following when quoting 35 USC 103 (a) which forms the basis for all obviousness rejections set forth in this Office action:

a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was

made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The above cited section 103 (a) in fact outlines precisely why the Examiner is incorrect when presenting his obviousness rejection thereunder, because this section specifically states very clearly that ".... *the subject matter sought to be patented and the prior art are such that THE SUBJECT MATTER AS A WHOLE would have been obvious.....*", which the Examiner has completely failed to recognise.

When the Examiner cites:....."*Claims 64, 66, 67, 70, 71, 76, 78, 79 and 83 are rejected under 35 USC 103(a) as being unpatentable over Arenson as applied to the claims above and further view of US Patent No. 5,888,060 to Velke ("Velke")*" the Examiner is listing only some of Applicant's dependent Claims, which do not at all disclose or describe the invention. All the above cited Claims are dependent Claims, and as such are meaningless without inclusion of the wording and the description of the independent Claim to which they relate.

In fact, when using rejected Claim 70 as an example, said Claim already reads *"A method according to Claim 63, wherein the combustion mechanism is a furnace"* which, when used for the purpose of comparing against prior art should be viewed in its entirety, or as " *THE SUBJECT MATTER AS A WHOLE"* , whereby Claim 70 would properly read as follows:

70. ***A method*** *for reducing fuel density while increasing combustion air density, without effecting specified fuel or air volumes, thereby significantly*

changing the ratio of fuel mass versus combustion air mass, hence oxygen mass, during the process of ignition and combustion of fluid hydrocarbon fuels in combustion mechanisms having a combustion area and at least one burner therein for converting said fuel into heat, thrust, torque or other energy, comprising:

a) providing a constant volume of fluid hydrocarbon fuel as fuel for said combustion mechanism;

b) directing said constant volume of fuel through a primary fuel supply conduit defining a heat exchanger assembly that extends through a heating zone related to the combustion or exhaust vent area of the combustion mechanism, having a fuel inlet and a fuel outlet;

d) reducing the density of said fuel by reducing fuel mass in said constant volume of fuel through heating the fuel to an optimal operating temperature level ranging between 100 degrees Fahrenheit and the fuel's flash point or auto-ignition temperature level as it flows through said heat exchange assembly;

i) maintaining a constant volume of density reduced fuel for ignition in the combustion area of said combustion mechanism;

j) providing a constant volume of combustion air for the combustion process in said combustion mechanism;

k) directing said constant volume of combustion air through a primary air supply conduit defining a heat exchanger assembly that extends through a cooling zone having an air inlet and an air outlet;

l) increasing air density of said constant volume of combustion air through cooling said combustion air to an optimal operating temperature of between ambient temperature or plus 50 degrees and minus 40 degrees Fahrenheit as it flows through said air heat exchanger assembly;

m) maintaining a constant volume of cooled high density air for combustion in the combustion area of said combustion mechanism;

wherein the combustion mechanism is a furnace.

Based on the above demonstration and argument, the Examiner is making incomplete and faulty comparisons with the prior art cited, both the Arenson and the Velke 5,888,060 disclosures. Just because Arenson and Velke teach the use of a heat storage material to support the method of their invention does not preclude that the inventions are similar. In fact they are not similar at all.

The Examiner further states that:

"Arenson discloses all the limitations of claims 64, 66, 67, 70, 74, 76, 78, 79, and 83 except for an insulating or heat storage material forming part of the heat exchanger assemblies, one of the heat transfer zones being related to the combustion area of the combustion mechanism, and that the combustion mechanism is a furnace or process heater".

The Examiner should have recognised that the Arenson invention discloses the use of heat for converting a cryogenic liquid fuel from its ambient temperature of minus 260 degrees Fahrenheit to a vaporised fuel at a temperature anywhere between 6 degrees and 168 degrees Fahrenheit. Furthermore, the Examiner should have noticed that Arenson does in fact not claim any fuel temperature range in any of his claims.

Applicant's invention instead discloses the use of a fluid hydrocarbon fuel already at an ambient fuel delivery temperature range of 37 degrees Fahrenheit from below ground level, a temperature at which the fuel disclosed by Arenson is no longer in a liquefied cryogenic state, then heating said fuel to a temperature range of between 100 degrees and 900 degrees Fahrenheit. Furthermore, Applicant discloses an invention which combines the heating of said type of fuel with the cooling of combustion air, a combination specifically for the purpose of increasing the oxygen ratio in the combustion process. Therefore it is not at all obvious that *"the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains"*, and it is actually contrary to the provision in and the intent of 35 USC section 103(a) for the Examiner to pose a rejection thereunder.

The Examiner further cites the following:

Velke teaches a device for pre-heating fluid fuel to decrease its density and thus increase efficiency that is considered analogous prior art. In Velke, a heat storage material forms part of a heat exchanger assembly (see col.4, lines 18 - 23) for the purpose of equalising heat transfer from the heating zone to the heat exchanger during on/off cycles of the appliance. Velke also teaches the use of insulating material (21) in the heat exchanger shown in Figure 4 for the purpose of protecting against external heat loss. Velke also teaches that the heat transfer zone is operated from a source other than the combustion or exhaust gas vent area of the combustion mechanism in the case where access to such heat source location is difficult (see col.4, lines 16 -18). Velke further teaches the use of a heat transfer

zone being related to the combustion area of the combustion mechanism for the purpose of increasing efficiency of the appliance (see the abstract). The fuel employed is natural gas, propane gas, or other conventional fluid hydrocarbon fuel (see col. 3, lines 64 - 65). In regard to claims 34 and 35, the combustion device disclosed by Velke is a combustion appliance that may be a furnace or heating devices (see col.4, lines 45 - 46 and col.8, lines 45 - 51).

When citing Patent 5,888,060, the Examiner repeats the mistake made with the Arenson comparison. The Examiner is again using dependent Claims in his comparison without referencing and including the basic invention which is specifically disclosed in the independent Claims, which are then narrowed by the dependent Claims. The much large temperature range between fuel and air as claimed by Applicant to improve the oxygen ratio, a range as high as 1400 degrees Fahrenheit, would exclude any reason for comparison to establish obviousness.

Furthermore, as is described in 5,888,060 in column 5 lines 31 to 67, the expected result on which the invention is based is the increase in fuel volume ONLY, without claiming an increase in the oxygen ratio. In column 3 lines 9 to 25 Velke discloses that fuel volume may be increased or expanded by some 15% when preheating the fuel to 115 degrees Fahrenheit. In fact, as anyone familiar in the art understands, a certain advantage may be obtained in the process of combustion when the fuel volume flow, better explained as fuel flow speed, can be increased, an improvement in the combustion process can be obtained. This more specifically describes the invention disclosed in the 5,888,060 Patent.

In the present invention, Applicant distinctly claims an increase of the oxygen ratio in the maintained as specified combustion oxidation mixture volume.

In other words, Velke, in US Patent 5,888,060, instead claims a method resulting in a reduction of fuel consumption by way of increasing fuel volume, or (decreasing fuel density), claiming the advantage of increasing fuel volume to be the invention, but the invention does not contemplate, disclose or even claim any increase in the oxygen ratio in the fuel / air mix (the oxidation mixture) while maintaining specified volumes, nor does the 060 disclosure make any reference to the method of using the combination of heating of fuel and cooling of combustion air for the purpose of improving said oxygen ratio, even though, as the Examiner states, some of the intermediate operating stages disclosed in some of the dependent Claims of both inventions may be similar. Any such similarity of some of the operating components does NOT conclude the basis of both inventions to be identical. In fact, the disclosed methods are in stark contrast.

Although the prior art cited is not relied upon, Applicant nevertheless provided the above response to demonstrate and prove the Examiner's further obvious error.

It must also be noted that, when referencing Patent 5,888,060, the Examiner is not able to cite any Claims of said disclosure in order to substantiate relevancy as to obviousness. All citations are in reference to the description of the invention, but then only to segments and components which are claimed in dependent Claims. Such dependent Claims however do not describe the operating method or device of the invention, but describe instead only certain limitations to the independent Claims

they are to narrow. This includes the use of a heat storage material, the possible employment of a heating zone other than from the combustion mechanism, or a heating zone operated by the combustion mechanism. It further includes reference to a combustion mechanism possibly being a furnace or heating device. These are all references which do not provide any indication of obviousness to a person of ordinary skill in the art at the time the invention was made, including the Arenson disclosure which provides no plausible reason for the obviousness rejection.

The Examiner is of course mistaken when suggesting such conclusion, and Applicant will again provide the necessary expert opinion by someone very skilled in the art, that such conclusion is contrary to expectations in the industry, even when supportive details, and in fact test results, were supplied.

Applicant again provides the Examiner with a copy of an opinion letter by CGRI the Canadian Gas Research Institute:

In a letter addressed to Applicant, dated April 27, 1999, CGRI Research Engineer Martin Thomas provided an opinion on behalf of the Canadian Gas Research Institute, stating that:
"Oxygen enrichment of the combustion air (i.e. increasing the oxygen concentration in a volume of combustion air) is a well established industrial process improvement technique. In our opinion, the "Velke Invention of" *preheating a fuel gas does not provide oxygen enrichment. To our knowledge, oxygen enrichment can only be achieved by adding oxygen to air, or by removing the other constituents (nitrogen, CO2, argon, etc.) from the air.* ***Therefore, we cannot support the claims***

made for the* "Velke Disclosure"** ***as a result of improvements caused by oxygen enrichment."

CGRI the Canadian Gas Research Institute, a well recognised authority in the gas industry, thereby confirms industry opinion that the any enrichment or increase in the oxygen ratio of a given volume of combustion air can only be achieved by adding actual oxygen, or by removing the other constituents, but cannot be achieved by any other means, such as preheating of fuel or precooling of combustion air.

CGRI concludes its letter of opinion by stating that "*Because CGRI is unable to explain, through sound scientific principles, the claimed / measured benefits,....CGRI will no longer be involved in the evaluation process."*

Applicant's invention is therewith definitely confirmed again as being unique. Therefore, the method in 5,888,060, even in conjunction with the details disclosed by Arenson, would not lead any person skilled in the art to the conclusion the Examiner was able to reach. Applicant again believes to have sufficiently demonstrated and proven that the Examiner has made a mistake in his rejection.

Applicant will attach a copy of a confidential report by the ETV Environmental Technology Verification institution, dated as late as June 2000, which Institution operates under the Ministry of the Environment, Government of Canada, and further confirms that CGRI Canadian Gas Research Institute admits but to a combustion efficiency improvement of the invention which is relative only to the amount of energy added to the fuel by way of preheating, rather than to any

other possible effect. In fact, CGRI considered any other claimed effect as a claim which is considered breaking the law of thermodynamics.

To this day, the industry only recognizes and agrees with the increase in energy input achieved relative to the energy increase resulted from the amount of energy added through pre-heating of the fuel, but never recognizes or agrees to any increase in the kinetic combustion improvement or improvement of the oxygen ratio in the combustion process, due to such fuel pre-heating.

So much for the Examiner rejecting the invention for being obvious to someone familiar in the art.

10. Prior Art

The Examiner states that the prior art made of record and not relied upon is considered pertinent to Applicant's disclosure. The Examiner is further of the opinion that these references disclose methods and apparatus with many, if not all, of the claimed limitations.

The Examiner already incorrectly cited the following when quoting 35 USC 103 (a) which forms the basis for all obviousness rejections set forth in this Office action:

a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was

made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

If the Examiner would have more specifically reviewed the complete text, the Examiner would have found that the before cited section 103 (a) in fact outlines precisely why the Examiner is incorrect when presenting his obviousness rejection thereunder, because this section specifically states very clearly that ".... *the subject matter sought to be patented and the prior art are such that THE SUBJECT MATTER* ***AS A WHOLE*** *would have been obvious.....",* which the Examiner obviously has completely failed to recognise.

In fact, the Examiner should not have cited US Patent 6,736,118, it being the Parent Patent of applications 10/614,004, 10/798,292 and 10/798,294, in which circumstance the Examiner should be guided by the following Office Rule:

35 U.S.C. 121 DIVISIONAL APPLICATION provides the following rule.
If two or more independent and distinct inventions are claimed in one application, the Director may require the application to be restricted to one of the inventions. If the other invention is made the subject of a divisional application which complies with the requirements of section 120 of this title, it shall be entitled to the benefit of the filing date of the original application. A patent issuing on an application with respect to which a requirement for restriction under this section has been made, or on an application filed as a result of such requirement, shall not be used as reference either in the Patent and Trademark Office or in the courts against a divisional application or against the original application or any patent issued on

either of them, if the divisional application is filed before the issuance of the patent on the other application.

which of course is the case in the present circumstance !

With regard to listed prior art US 6,557,535 Kevin Stone, US 6,408,831 Craig et al., US 5,888,060 William Velke, US 5,443,053 Jack Johnson, US 5,224,334 Ronald Bell, US 5,222,476 Konrad Chmielewski, US 4,622,007 Grigory Gitman, US 3,720,057 Edwin Arenson, and US 6,283,087 Kjell Isaksen, even though the Examiner is not relying on such prior art, the Examiner has nevertheless cited all such listed prior art in error.

Non of the cited prior art relate to a combination method of preheating fuel and precooling combustion air as disclosed by Applicant, with the specific purpose of increasing the oxygen ratio mix during the combustion process of any fluid hydrocarbon fuel while maintaining the specified fuel and combustion air volumes, and thereby effecting a significant combustion efficiency improvement not otherwise obtainable.

US 6,557,535 ***System and method for transferring heat from exhaust gasses to compressed gas fuel***

Abstract

A system and method for transferring heat from the exhaust of an internal combustion engine to a fuel container storing compressed gas fuel, using a gaseous heat transfer medium. The heat transferred to the fuel container assists expansion and/or vaporization of the compressed gas fuel.

The expanded and/or vaporized compressed gas fuel may be delivered to the internal combustion engine for use by the engine.

To anyone familiar in the art, it is obvious from the Abstract of US 6,557,535 that the disclosed fuel preheating is for the purpose of vaporizing a compressed gas, which may be at a temperature as low as 240 degrees F., conditioning the fuel to facilitate ignition, and the invention in no way discoses any combination method similar to the method disclosed inj the present application.

US 6,408,831 ***System for controlling the temperature of an intake air***

Abstract

A vehicle operates under various ambient conditions and various operating parameters. To compensate for the ambient condition and the operating parameters an engine, an intake air temperature is controlled. One of an ambient air flow restriction system or an intake air flow restriction system is used to vary the flow of a recipient ambient air flow through an air to air or the flow of a donor intake air flow through the aftercooler respectively. A plurality of louvers are operatively moved between a closed position and an open position with the ambient air flow restriction system. And, a flapper valve is operatively moved between a closed position and an open position with the intake air flow restriction system. A controller interprets a respective signal from a plurality of sensors to define the position of the plurality of louvers or to define the position of the flapper valve.

To anyone familiar in the art, it is obvious from the Abstract of US 6,408,831 that the invention does not disclose a combination of preheating of fuel with the

precooling of combustion air under the conditions and for the purpose specified in the present application.

US 5,443,053 ***Fuel heater***

Abstract

A fuel heater for improving the fluidity of fuel, vaporization of fuel, and combustion of fuel to thereby minimize emissions and maximize power output for an engine includes a chamber in which a manifold is disposed such that a heat exchanger can extend therearound. The manifold includes openings for introducing fluid medium into the chamber which open in different directions thereby creating a more uniform turbulence in the chamber and enhancing the transfer of heat to the fuel. The arrangement of the manifold and heat exchanger increases the amount of heated fluid medium which comes into contact with the heat exchanger by overcoming the effect of boundary layers. The fuel heater includes a fuel mixing chamber and a fluid medium reservoir which are utilized to control the temperature of fluid medium entering the chamber and, accordingly, the temperature of fuel exiting the heater. The fuel heater includes various arrangements for providing heat to the fuel heater and control arrangements therefore.

To anyone familiar in the art, it would be already obvious from the Abstract of US 5,443,053 that the disclosed fuel preheating process is strictly for the purpose of improving the fluidity of the fuel and for vaporizing it, and the invention in no way discoses any combination method similar to the combination method detailed in the present application, which is to sustantially improve the oxygen ratio of the oxydation mixture such as to increase combustion efficiency in a way usually only achieved by injecting pure oxygen into the mixture during ignition.

US 5,224,334 Low NO.sub.x cogeneration process and system

Abstract

A process and system for low NO.sub.x cogeneration to produce electricity and useful heat. Fuel and oxygen are provided to an internal combustion engine connected to drive an electric generator, to thereby generate electricity. An exhaust stream is recovered from the engine at a temperature of about 500.degree. to 1000.degree. F. which includes from about 6 to 15 percent oxygen. Fuel is added to the exhaust stream to create a fuel-rich mixture, the quantity of fuel being sufficient to react with oxygen and reduce the NO.sub.x in said exhaust stream. The fuel-enriched stream is provided to an afterburner, and the fuel, NO.sub.x and available oxygen are reacted to provide a heated oxygen-depleted stream. The oxygen-depleted stream is cooled in a first heat exchanger. Conversion oxygen is admixed with the cooled stream which is then passed over a catalyst bed under overall reducing conditions. NO is converted to NO.sub.2 at the forward end of the bed, and the NO.sub.2 then reacts on the remainder of the bed with excess combustibles. The stream from the reducing catalyst bed is cooled from a temperature of 750.degree. to 1250.degree. F. to about 450.degree. to 650.degree. F. and air is added to produce a further cooled stream at 400.degree. to 600.degree. F. having a stoichiometric excess of oxygen, and the further cooled stream is passed over an oxidizing catalyst bed to oxidize remaining combustibles. The resultant low NO.sub.x stream can then be provided for venting.

As is immediately obvious to anyone familiar in the art, US US 5,224,334 discloses a method for cogeneration of low NO.sub.x after ignition, which reduces such harmful emission products in the combustion exhaust stream.

In fact, the stream from the reducing catalyst bed is cooled from a temperature of between 750.degree. to 1250.degree. F., to about between 450.degree. to 650.degree. F., and air is then added to produce a further cooled stream at 400.degree. to 600.degree. F. having a stoichiometric excess of oxygen, and the further cooled stream is passed over an oxidizing catalyst bed to oxidize remaining combustibles. All of this process is active after ignition of the fuel stream. The resultant low NO.sub.x stream can then be provided for venting.

The initial fuel stream in this process is enhanced with the injection of additional oxygen. This is obvious from the stated condition of the exhausted combustion air having a residue of about 6 to 15 percent oxygen. Such high level of oxygen is either due to an extremely excess of combustion air volume, which would be most inefficient, or is due to a process disclosed in the Patent as "*Fuel and oxygen are provided*" which indicates the injection of pure oxygen.

This of course is all contrary to the method and process disclosed in the present application, and the Examiner has mistakenly cited such prior art.

US 5,222,476 ***Low NOx aspirated burner apparatus***

Abstract

A low NOx burner assembly of a fuel-fired heating appliance is supplied with an air/fuel mixture having a substantially less than stoichiometric air-to-fuel ratio. The air-rich mixture is partially combusted to create primary combustion products disposed within an open inlet portion of a combustor structure having a catalytic converter operatively positioned within an open outlet portion thereof spaced apart

from its open inlet portion. A flow of aspirating air is introduced into the combustor structure between the inlet and outlet portions thereof. The aspirating air mixes with the primary combustion products, cools them, and flows with them outwardly through the catalytic converter. This essentially completes the combustion of the remaining fuel within the cooled primary combustion products, and does so at a temperature not appreciably greater than the initial combustion flame temperature to thereby substantially reduce NOx emissions without the use of flame quenching techniques. The burner assembly is representatively illustrated as being incorporated in several types of forced air heating furnaces, but could also be used in other types of fuel-fired heating appliances such as boilers and water heaters.

Again, as is immediately obvious to anyone familiar in the art, US 5,222,476 again, similar as in US 4,224,334, discloses a method for cogeneration of low NO.sub.x after ignition, which reduces such harmful emission products in the combustion exhaust stream.

As is obvious to anyone familiar in the art, the method and combination operating process disclosed in the present application is activated prior to ignition of the fuel / combustion air mixture.

4,622,007 ***Variable heat generating method and apparatus***

Abstract

Method and apparatus for high temperature heating, melting, refining and superheating of materials, such as steel scrap, metals, ceramics or glass. The invention provides an economizing method of hydrocarbon fluid fuel combustion in

an ongoing flame in a liquid cooled combustion chamber by separately supplying streams of fuel and at least two oxidizing gases wherein a first oxidizing gas reacts with the fuel, and a second oxidizing gas is directed about the flame core to further react with the fuel, while controlling the flow of the fuel, the oxidizing gases and cooling liquid to provide the required heat input, combustion product chemistry, temperature, velocity, emissivity and combustion block temperature. Also disclosed are burners for carrying out the invention.

The process disclosed in US 4,622,007 relates to providing a *liquid cooled combustion chamber* for *hydrocarbon fluid fuel combustion in an ongoing flame* and is in no way even remotely related to the combination method and process disclosed in the application herein under examination. Applicant is unable to even remotely draw any comparison for a meaningful discussuion.

US 3,720,057 The Arenson Patent

This disclosure is already discussed indetail inder section 8. of this response. Appicant is of the opinion to have already substantially demonstrated that the Examiner is in error when citing the Arenson Invention.

US 6,283,087 Enhanced method of closed vessel combustion

Abstract

In a spark ignition (SI) turbine engine, the combustible fuel-air mixture is compressed by volume displacement and accelerated at high velocity into the ignition source, to reduce the combustion time relative to conventional SI engines,

lowering the lean fuel-air mixture flammability limit. Increased process velocity reduces the time exposure of the compressed fuel-air mixture to combustion, permitting near adiabatic operation without pre-ignition. Reducing the time exposure of the combustible gases to high combustion temperatures may reduce emission of oxides of nitrogen. The best power combustion velocity may be maintained throughout the fuel-air mixture range. Lean fuel-air mixture operation may result in fuel savings without a corresponding loss of power, and may reduce carbon dioxide emissions. The high speed operation may provide a quieter engine. An expander or a turbine may recover some of the exhaust energy loss associated with near adiabatic combustion.

The Examiner should understand that the operating method disclosed in invention US 6,283,087 is operational specifically and solely to.....*reduce the combustion time relative to conventional SI engines, and to lower the lean fuel-air mixture flammability limit* .....and does NOT at all include or even reference the preheating of a specified fuel volume combined with the precooling of a specified combustion air volume for the purpose of increasing the oxygen ratio in the oxidation mixture prior to ignition. The Examiner should be more precise when citing objections based on prior art.

US 5,888,060 ***The Velke Patent***

This invention distinctly discloses the preheating of fuel prior to ignition and does NOT include, make reference or even hint the operation of the combination method of preheating fuel with precooling combustion air for the purpose of increasing the oxygen ratio in the oxidation mixture prior to ignition.

If the Examiner finds that Applicant has posed any incomplete arguments or was not able to overcme the objections proposed by the Examiner, Applicant would appreciate the Examiner providing more specific, applicable and relative details.

The Examiner is of corse correct when suggesting the cited prior art rejections to be redundant,....redundant in their repetitive insuficiency.

11. Conclusion

Applicant is of the opinion to have demonstrated and proven that the Examiner has erred when finding that the amended Claims necessitated new grounds for rejection, and Applicant therefore formally requests under MPEP 706.07(d) that the Examiner reconsider and withdraw the rejection.

The Examiner may remember that his argument in the previous Office action citing rejection of this application under the doctrine of obviousness based on US Patent No. 6,736,118. Applicant is unable to comprehend how the Examiner was able to recognize obviousness between both inventions, when in fact the Examiner now claims that, under **Claim Rejections - 35 USC 112, second paragraph**, upon further review of the invention, the invention disclosed in this application is now indefinite for failing to particularly point out and distinctly claim the subject matter with Applicant regards as the invention.

Such argument is contradictory, and has absolutely no support in reality.

Although when previously incorrectly citing a double patenting rejection of this Divisional Application with its issued Parent Application, the Examiner was able to fully recognize the distinction in the subject matter of the invention, otherwise the Examiner would have been unable to come to such conclusion.

Such action is sometimes referred to as "going from bad to worse". Citing double patenting of a Divisional Application with its Parent Patent was an obvious and significant error, as Applicant has proven in his previous Office response. But for the Examiner now not able to recognize the subject matter of the same invention being again reviewed, and stating that Applicant is failing to particularly point out and distinctly claim the subject matter which Applicant regards as his invention, is seriously multiplying the error.

Applicant will be making the requested corrections in the description and attach the amendments or replacement sheets.

Applicant will further consider including a corrected drawing sheet properly identified.

Applicant further attaches a copy of the ETV Environmental Technology Verification, Canadian Government Confidential Report.

To summarize Examiner's Claim Rejection under 35 USC 112, Applicant provides a detaled analysis of independent method Claim 27 and independent device Claim 39, inserting (in brackets) pertinent references to matching descriptions in the specification, demonstrating Examiner's error when claiming that the subject matter

of the invention was not described in such a way as to reasonably convey to one skilled in the relevant art that the inventor, at the time the application was filed, had posession of the claimed invention:

*A **method** for reducing fuel density while increasing combustion air density*

(PAGE 4, third paragraph - "disclosed a method and device providing the present effect of reducing fuel density while at the same time maintaining or increasing combustion air density"),

(PAGE 4, third paragraph - "The present combination effect is generally achieved by pre-heating natural gas or propane gas, or other conventional fluid hydrocarbon fuels")

(Page 2, fourth paragraph - "The most significant (ogyen) **ratio change may be obtained through the combination of constantly elevating the fuel pre-combustion temperature level while at the same time maintaining or even reducing the combustion air temperature level)**

without effecting specified fuel or air volumes,

(PAGE 3, second paragraph - "as both combustion air and fuel flow volumes remain constant")

thereby significantly changing the ratio of fuel mass versus combustion air mass, hence oxygen mass,

(PAGE 3, second paragraph - "This would obviously result in a significant increase in the available oxygen in the relative combustion air mass")

during the process of ignition and combustion of fluid hydrocarbon fuels including natural gas and propane gas, in combustion mechanisms having a combustion area and at least one burner therein

(PAGE 4, third paragraph - "The present combination effect is generally achieved by pre-heating natural gas or propane gas, or other conventional fluid hydrocarbon fuel as it is delivered to the mechanism's burner manifold, while at the same time maintaining or reducing combustion air temperature when operating today's typical residential, commercial and industrial combustion mechanisms and appliances incorporating a burner arrangement located in a combustion zone")

for converting said fuel into energy, such as heat, thrust or torque,

(this reference the general description of a combustion process, which converts hydrocarbo fuel into energy, and with such energy being able to convert into the three basic forms, ...heat, thrust or torque.

This conversion process is well understood by anyone skilled in the relevant art)

comprising:

a) providing fluid hydrocarbon fuel as fuel for said combustion mechanism;

(PAGE 4, third paragraph - "The present combination effect is generally achieved by preheating natural gas or propane, or other conventional fluid hydrocarbon fuel, as it is delivered to the mechanism's burner manifold")

b) directing said fuel through the fuel supply conduit defining a heat exchanger assembly that extends through a heat transfer zone related to the combustion mechanism;

(PAGE 5, first paragraph, - "It comprises a fuel supply conduit defining a heat exchanger assembly located in the mechanism's manifold area")
(PAGE 6, first paragraph, - Fuel is routed from the incoming general fuel supply conduit past the combustion mechanism's operating valve through a fuel supply conduit defining a heat exchanger assembly, which is located in a heating zone generated by the mechanism")

c) reducing the density of said fuel by heating the fuel as it flows through said heat exchanger assembly to an optimal fuel operating temperature level ranging between 165 degrees Fahrenheit and the fuel's flash point or auto ignition level;

(PAGE 5, first paragraph, - "the heat exchanger configuration is designed to accomodate fuel flow such as to control delivery of fuel to the mechanism's burner orifice at a constant and pre-set desired optimal operating temperature range of between 125 and 900 degrees Fahrenheit .....The contemplated general fuel operating temperature however must range somewhere between above 100 degrees Fahrenheit and a temperature just below the fuel's flash point level.....which could reach as high as 1300 degrees Fahrenheit, depending on the type of fluid hydrocarbon fuel")

d) maintaining a constant volume of density reduced fuel to the combustion area of said combustion mechanism;

(it is of course understood by anyone skilled in the art, that, in order to operate a combustion mechanism for the purpose of performing the task of converting fuel to energy, the mechanism has to be supplied with a constant volume of fuel, and that in order to operate the mechanism in accordance with this invention, such constant volume of fuel has to have its density reduced constantly rather than intermittently)

e) providing combustion air for the combustion process in said combustion mechanism;

(PAGE 4, paragraph 3, - "...pre-heating .....fluid hydrocarbon fuel.....while at the same time maintaining ar reducing combustion air temperature.....(it is of course obvious to anyone skilled in the art, that combustion air must be combined with fuel to form the oxident mix for the combustion process)**....see Figure 1)**

f) directing said combustion air through an air supply conduit defining a heat exchanger assembly that extends through a heat

transfer zone of said combustion mechanism;

(PAGE 8, Figure 1 reference - "a heat exchanger 7 for the purpose of increasing the density of the combustion air 9 flowing through air inlet duct 8 for mixing with fuel at ignition burner area 4)

g) increasing the density of said combustion air by cooling the combustion air as it flows through said heat exchanger assembly to an optimal air operating temperature level of between plus 50 and minus 25 degrees Fahrenheit;

(PAGE 8, Figure 1 reference - "a heat exchanger 7 for the purpose of increasing the density of the combustion air 9 flowing through air inlet duct 8 for mixing with fuel at ignition burner area 4)

(PAGE 1, last paragraph - "To improve power output.....Heavy Vehicles Industry.....is testing a second-stage intercooler for LNG Liquid Natural Gas.... the concept uses LNG fuel to cool the intake air to increase combustion air density.....it is of course understood by anyone skilled in the art, that the LNG in its liquid state could be at a temperature level as low as minus 260 degrees Fahrenheit, and that, when such fuel is used in a heat exchange relationship with air, the air may be cooled to a temperature level much lower than minus 25 degrees or even minus 40 degrees Fahrenheit)

h) maintaining a constant volume of density increased combustion air to the combustion area of said combustion mechanism.

(it is of course understood by anyone skilled in the art, that, in order to operate a combustion mechanism for the purpose of performing the task of converting fuel to energy, the mechanism has to be supplied with a constant volume of combustion air, and that in order to operate the mechanism in accordance with this invention, such constant volume of combustion air has to have its density increased constantly rather than intermittently)

A device for reducing fuel density.....without effecting specified fuel volume

(PAGE 8, Figure 1 reference - "The fuel is then routed.....through heat exchanger 6, designed for the purpose of reducing the density of the fuel...)
(PAGE 3, second paragraph - "as both combustion air and fuel flow volumes remain constant")

while increasing combustion air density.....without effecting specified air volume

(PAGE 8, Figure 1 reference - " heat exchanger 7 for the purpose of increasing the density of the combustion air 9 flowing through air inlet duct 8 for mixing with fuel at ignition in burner area 4)
(PAGE 3, second paragraph - "as both combustion air and fuel flow volumes remain constant")

thereby significantly changing the ratio of fuel mass versus combustion air mass, hence oxygen mass

(PAGE 3, second paragraph - "This would obviously result in a significant increase in the available oxygen in the relative combustion air mass")

during the process of ignition and combustion of fluid hydrocarbon fuels including natural gas and propane gas, in combustion mechanisms having a combustion area and at least one burner therein

(PAGE 4, third paragraph - "The present combination effect is generally achieved by pre-heating natural gas or propane gas, or other conventional fluid hydrocarbon fuel as it is delivered to the mechanism's burner manifold, while at the same time maintaining or reducing combustion air temperature when operating today's typical residential, commercial and industrial combustion mechanisms and appliances incorporating a burner arrangement located in a combustion zone")

for converting said fuel into energy, such as heat, thrust or torque,

(this reference the general description of a combustion process, which converts hydrocarbon fuel into energy, and with such energy being able to convert into the three basic forms, ...heat, thrust or torque. This conversion process is well understood by anyone skilled in the relevant art)

comprising:

a) a fuel supply conduit defining a heat exchanger assembly located in a heating zone related to the combustion area of the mechanism

(PAGE 5, first paragraph, - "It comprises a fuel supply conduit defining a heat exchanger assembly located in the mechanism's manifold area")

(PAGE 6, first paragraph, - Fuel is routed from the incoming general fuel supply conduit past the combustion mechanism's operating valve through a fuel supply conduit defining a heat exchanger assembly, which is located in a heating zone generated by the mechanism")

providing the means to maintain a constant supply of fluid hydrocarbon fuel to the combustion area of said mechanism at a preselected optimal temperature level ranging between 165 degrees Fahrenheit and the fuel's flash point or auto ignition level

(PAGE 5, first paragraph, - "the heat exchanger configuration is designed to accommodate fuel flow such as to control delivery of fuel to the mechanism's burner orifice at a constant and pre-set desired optimal operating temperature range of between 125 and 900 degrees Fahrenheit .....The contemplated general fuel operating temperature however must range somewhere between above 100 degrees Fahrenheit and a temperature just below the fuel's flash point level.....which could reach as high as 1300 degrees Fahrenheit, depending on the type of fluid hydrocarbon fuel")

b) a combustion air supply conduit defining a heat exchanger assembly located in a cooling zone related to the combustion mechanism,

(PAGE 8, Figure 1 reference - "a heat exchanger 7 for the purpose of increasing the density of the combustion air 9 flowing through air inlet duct 8 for mixing with fuel at ignition burner area 4)

providing the means to maintain a constant volume of combustion air to the combustion area of the combustion mechanism at a preselected optimal operating temperature level ranging between plus 50 and minus 40 degrees Fahrenheit

(PAGE 8, Figure 1 reference - "a heat exchanger 7 for the purpose of increasing the density of the combustion air 9 flowing through air inlet duct 8 for mixing with fuel at ignition burner area 4)

(PAGE 1, last paragraph - "To improve power output.....Heavy Vehicles Industry.....is testing a second-stage intercooler for LNG Liquid Natural Gas.... the concept uses LNG fuel to cool the intake air to increase combustion air density.....it is of course understood by anyone skilled in the art, that the LNG in its liquid state could be at a temperature level as low as minus 260 degrees Fahrenheit, and that, when such fuel is used in a heat exchange relationship with air, the air may be cooled to a temperature level much lower than minus 25 degrees or even minus 40 degrees Fahrenheit)

In addition, Examiner should also refer to the abstract of the invention, which was not objected to by the Examiner and must therefore be assumed to be proper, and which, according to MPEP 608.01(b) states the following:

"The purpose of the abstruct is to enable the Patent Office and the public generally to determine quickly from a cursory inspection the nature and gist of the technical disclosure;"

Under "Content" it cites the following:

"A patent abstract is a concise statement of the technical disclosure of the patent and should include that which is new in the art to which the invention pertains;"

Applicant is of the opinion to be in complete compliance with such practice, and Examiner's acceptance of the abstract as submitted provides verification.

The Abstract reads as follows:

"A method and device for changing the rate of density between fluid hydrocarbon fuels and combustion air prior to ignition and combustion in residential, commercial and industrial combustion mechanisms, by extracting heat from the mechanism's combustion zone or flue area to reduce the density of the fuel prior to delivery to the mechanism burner at a constant, pre-set operating temperature of between 100 degrees Fahrenheit and the fuel's flash point temperature, while at the same time providing means to control combustion air temperature to a level such as to increase air density and significantly changing the mass ratio of fuel mass versus combustion air mass, hence oxygen mass, without increasing combustion air volume or fuel volume, thereby improving combustion efficiency, heat transfer efficiency and reduction in harmful stack emissions."

The Abstract describes the invention properly and completely when it details:

1) changing of density of fuel through heating, thereby reducing density;
2) changing of density of combustion air through cooling, thereby increasing density;
3) maintaining the specified fuel and air volumes, critical specification;
4) increasing the oxygen mass ratio in the fuel / air oxidation mixture;
5) raising fuel temperature to between 100 degrees Fahrenheit and the fuel flash point temperature; (because of combustion danger, a critical temperature range is specified;
6) reducing combustion air temperature such as to increase air density sufficiently

to cause a significant increase in the oxygen mass ratio, (no combustion danger at any temperature range and no critical temperature range is referenced)

7) providing fluid hydrocarbon fuel for the operation of the combustion mechanism;

When detailing the Abstract as herebefore, it is obvious that, on its own merits, the Abstract is definite and particularly points out and distincly describes the subjet matter which Applicant regards as the invention, and if the Examiner finds that Applicant's Claims do not distinctly claim the subject matter, the Examiner should make a comparison between Claims and the Abstract, in which case the Examiner might find to be incorrect when rejecting Applicant's Claims

Dependent Claims 28 to 38, which are dependent on Claim 27, and dependent Claims 40 to 48, which are dependent on Claim39, are all Claims which obviously directly relate to such independent Claims, and which are relied upon to narrow and further limit of the independent Claim, or more specifically and precisely define the scope of the independent Claims in accordance with prescribed Office practice. Therefore, such dependent Claims are construed to include all the limitations of the Claim incorporated by reference into the dependent Claim, as Applicant already previously cited on page 46, 47 and 48 of this response. Please refer to MPEP 608.01(i) and 37 CFR 1.75. Claims.

Based on the by Applicant before stated arguments and verifications, Applicant is of the opinion that, unless the Examiner is able to overcome all the reasoning presented by Applicant, the Examiner has without doubt failed to demonstrate that the deficiencies cited, such as **Drawings, Claim Rejection - 35USC 112 first and second paragraph, Double Patenting, Claim Rejections -**

35USC 102, Claim Rejections - 35 USC 103 are reasonable or are within the cited rules, regulations or Office practice. Applicant further draws attention to this Office Action dated July 25, 2005, which, as indicated by the Examiner in the Office Action Summary, is in response to communication filed December 23, 2004, representing a seven month turnaround period.

Applicant will further replace both independent and dependent Claims with new Claims such that all will relate to Patent Classification 431, COMBUSTION, which is the Class defined to relate specifically to a combustion process as claimed in Applicant's disclosure:

CLASS 431,
COMBUSTION

SECTION I - CLASS DEFINITION

*This is the residual class for **processes** of combustion or combustion starting, and for apparatus peculiarly adapted to burn or ignite materials.*

SECTION II - NOTES TO THE CLASS DEFINITION

(1) Note. A fuel discharge nozzle is a subcombination of basic subject matter of this class if it is specialized for use in combustion solely (1) by discrete means transmitting flame between distinct fuel discharge areas; (2) by flashback preventing or controlling structure
(3) by an incandescing component; (4) by means maintaining a reigniting flame; or (5) by flame enclosing, protecting or stabilizing structure.

(2) Note. Patents issued prior to 1940 have not in all instances been classified by their claimed disclosure so the placement of these patents does not necessarily indicate lines of classification.

Applicant depends on the Office rule and relies not only on the description and on the drawings as filed, but also on the Claims, as their content justifies it. Applicant therefore respectfully requests the Examiner to move this Application to allowance. Should any minor adjustments or amendments still be required, Applicant will under Examiner's guidance provide any such reasonably required adjustment forthwith.

Signed this 8th day of August, 2005,

William H. Velke
Applicant

Attachments:

Amended Description
ETV Confidential Report
Claims Amendments

ETV CONFIDENTIAL REPORT ON FUEL PREHEATING INVENTION

Heat Input Increase

Improved combustion efficiency is an improvement in the conversion of the fuel into Carbon Dioxide (CO_2) and Water (H_2O). This is evidenced by a reduction in the volume of Carbon Monoxide (CO) emissions.

Volume of CO with Tylon Activated = 2.84 in^3 = 0.0465394 dm^3 = 0.00208 mol

Volume of CO with Tylon Bypassed = 4.61 in^3 = 0.0755445 dm^3 = 0.00337 mol

The Enthalpy of formation of Carbon Dioxide and Carbon Monoxide are:

ΔH_f CO = -110.5 kJ/mol

ΔH_f CO_2 = -393.5 kJ/mol

Difference between CO and CO2 energy release = 283 kJ/mol

Difference in CO emitted = 0.00129 mol

Therefore the additional energy released due to improved combustion efficiency, when the Tylon Fuel Saver is Activated

= 0.00129 x 283 = 0.36507 kJ = 0.346 Btu

The furnace used 3.174 ft^3 of Propane in 10 minutes when the Tylon Fuel Saver was activated. Therefore in 5 minutes 1.587 ft^3 was consumed.

The calorific value of the Propane used was 2500 Btu/ft^3.

Therefore in 5 minutes 3967.5 Btu were input to the furnace as chemical energy in the fuel.

CGRI has in the past calculated the increased energy input due to the higher temperature of the fuel when the Tylon Fuel Saver is activated. This equates to 75.4 kJ/m^3 or 2.024 Btu/ft^3, which in 5 minutes was 3.212 Btu.

It can thus be said that the increase in energy input to the furnace due to fuel heating and an improvement in combustion efficiency was 3.558 Btu.

That is, **an increased energy input of 0.09 %** (This analysis did not include a possible improvement to the low level of propane slippage that can occur on burner ignition and extinction, as it was not measured. However, it would not be expected to add a significant amount to the increase in energy input).

The above increase in energy input is far outweighed by the measured decrease in fuel volume (2.3%) to the furnace due to the change in thermophysical properties of the fuel and temperature effects on the combustion system (orifice, burners, etc).

Furnace Efficiency

CGRI has in the past calculated a few snapshot efficiencies from the data provided by ITS, see below.

Tylon Flue Loss Efficiency

For Cycle # 2

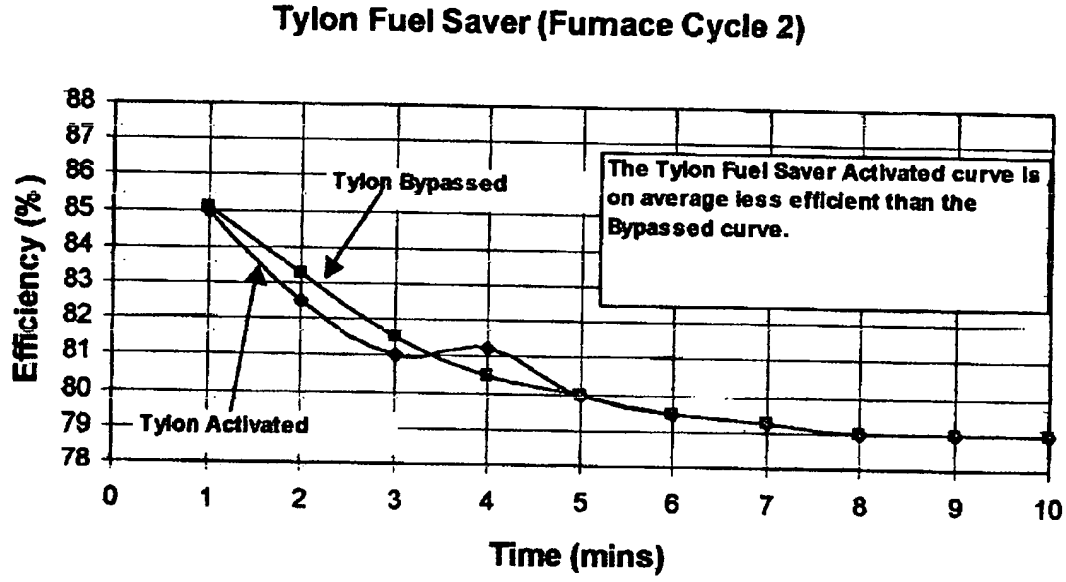
Activated Time	Flue CO2 %	Flue Temperature after Tylon (F)	Combustion Air Temperature (F)	Delta T (F)	Flue Loss %	Efficiency %
0						
1	6.6	212	58.9	153.1	15	85
2	6.3	275.6	60	215.6	17.5	82.5
3	6.26	318.1	59.7	258.4	19	81
4	7.34	342.8	58.5	284.3	18.75	81.25
5	6.44	359	60.8	298.2	20	80
6	6.4	369.2	59.1	310.1	20.5	79.5
7	6.42	374.4	59.8	314.6	20.75	79.25
8	6.35	378	59.5	318.5	21	79
9	6.44	379.3	59.9	319.4	21	79
10	6.4	380.4	60.1	320.3	21	79

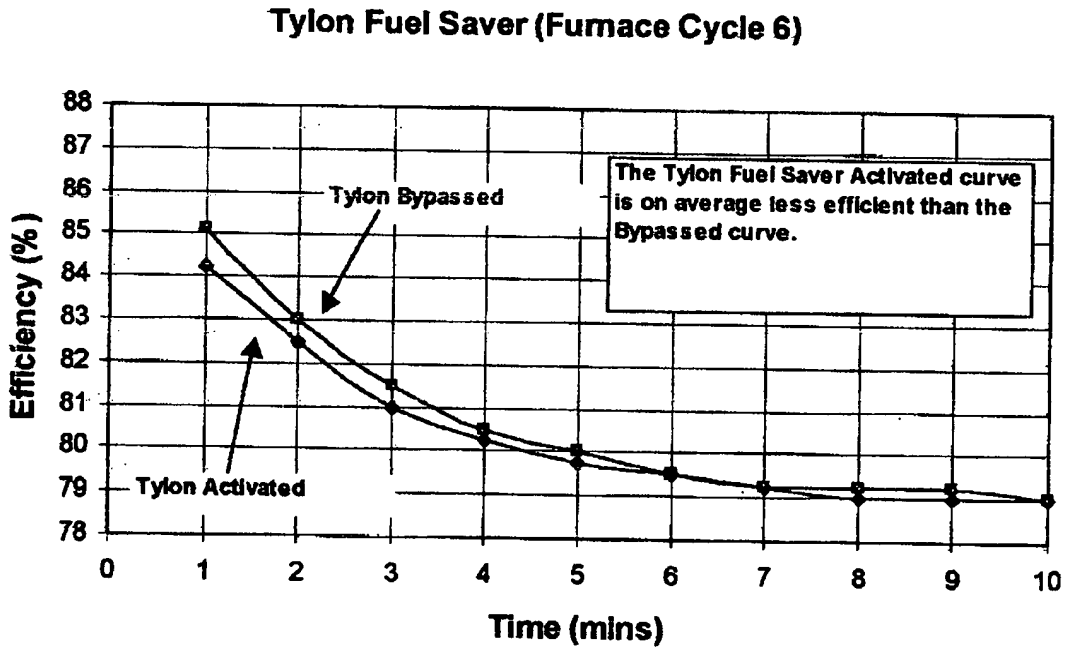
Bypassed Time	Flue CO2 %	Flue Temperature after Tylon (F)	Combustion Air Temperature (F)	Delta T (F)	Flue Loss %	Efficiency %
0						
1	5.99	168.8	58.4	110.4	14.9	85.1
2	6.33	253.2	58.6	194.6	16.75	83.25
3	6.36	304.4	59.8	244.4	18.5	81.5
4	6.46	337.4	60	277.4	19.5	80.5
5	6.49	358.2	60.7	297.5	20	80
6	6.54	389.8	60.4	309.4	20.5	79.5
7	6.51	377.6	60.6	317	20.75	79.25
8	6.54	382.2	60.4	321.8	21	79
9	6.54	385.1	61.4	323.7	21	79
10	6.56	387	60.7	326.3	21	79

For Cycle #8

Activated Time	Flue CO2 %	Flue Temperature after Tylon (F)	Combustion Air Temperature (F)	Delta T (F)	Flue Loss %	Efficiency %
0						
1	5.86	214.2	58.3	155.9	15.75	84.25
2	6.26	277.8	59.3	218.5	17.5	82.5
3	6.38	317.7	60.6	257.1	19	81
4	6.34	343.2	61.2	282	19.75	80.25
5	6.36	359.1	61.3	297.8	20.25	79.75
6	6.41	368.1	61.3	306.8	20.5	79.5
7	6.31	373.1	61.7	311.4	20.75	79.25
8	6.31	376.7	60.5	316.2	21	79
9	6.31	379.2	61.1	318.1	21	79
10	6.33	380.7	61.5	319.2	21	79

Bypassed Time	Flue CO2 %	Flue Temperature after Tylon (F)	Combustion Air Temperature (F)	Delta T (F)	Flue Loss %	Efficiency %
0						
1	5.86	168.1	59.5	108.6	14.9	85.1
2	6.19	253.8	59.8	194	17	83
3	6.32	305.6	59.9	245.7	18.5	81.5
4	6.45	338.1	60.2	277.9	19.5	80.5
5	6.47	357.8	60.5	297.3	20	80
6	6.48	370.1	60.8	309.3	20.5	79.5
7	6.54	377.4	60.3	317.1	20.75	79.25
8	6.53	382.6	61.2	321.4	20.75	79.25
9	6.54	385.1	60.7	324.4	20.75	79.25
10	6.56	387.3	61.1	326.2	21	79





These overall efficiency figures were calculated using the "flue loss method". This method determines the sensible and latent energy lost in the combustion products going up the flue. The figures are determined by temperature differences between what goes in and what comes out and also from the flue Carbon Dioxide concentration, which gives an indication of the excess air level in the flue.

The Efficiency determined using this method includes both the energy output in the load air and the energy lost from the furnace to its surroundings.

The energy lost from the furnace to its surroundings (casing or jacket losses) was not measured, however they are generally not very high and for a furnace would contribute to the heating of a house. It is CGRI's opinion that the casing losses would not have changed significantly when the Tylon Fuel Saver was activated as compared to its being bypassed, during the ITS testing.

In Conclusion

There was a net decrease in the energy supplied to the furnace and an increase (or no change) in the energy being lost up the flue, so unless there was a significant change in the casing losses (which cannot be determined) there is no explanation for the dramatic increase in energy output in the load air being claimed.

CGRI is unwilling to support any claim that implies that the first law of thermodynamics is being broken.